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(54) **ELECTRICAL CONNECTOR WITH AN IMPROVED TERMINAL BASE**

(71) Applicant: **FOXCONN INTERCONNECT TECHNOLOGY LIMITED**, Grand Cayman (KY)

(72) Inventors: **Xing-Liang Liu**, Shenzhen (CN); **Hong-Jing Luo**, Shenzhen (CN)

(73) Assignee: **FOXCONN INTERCONNECT TECHNOLOGY LIMITED**, Grand Cayman (KY)

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H01R 13/504	(2006.01)
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H01R 24/60	(2011.01)
B29L 31/36	(2006.01)
H01R 13/6599	(2011.01)
H01R 31/08	(2006.01)

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CPC ***B29C 45/14639*** (2013.01); ***B29C 45/1671*** (2013.01); ***H01R 12/725*** (2013.01); ***H01R 13/504*** (2013.01); *B29C 2045/1673* (2013.01); *B29L 2031/36* (2013.01); *H01R 13/6599* (2013.01); *H01R 24/60* (2013.01); *H01R 31/08* (2013.01)

(58) **Field of Classification Search**

USPC 439/86, 76.1; 29/882, 849; 264/232, 264/104, 40.5

See application file for complete search history.

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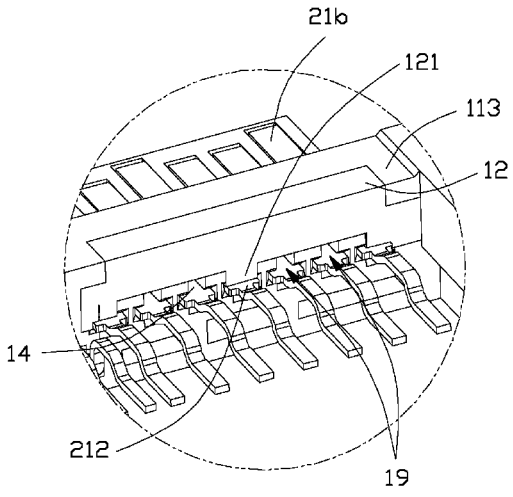
Primary Examiner — Alexander Gilman

(74) *Attorney, Agent, or Firm* — Wei Te Chung; Ming Chieh Chang

(57) **ABSTRACT**

An electrical connector includes a terminal base and plurality conductive contacts, and the conductive contacts defining a first group of contacts, and the first group of contacts including several signal contacts and several grounding contacts arranged with the signal contacts at intervals. The terminal base includes an insulative housing, and a conductive plastic block integrally molded with the insulative housing and combining with the insulative housing seamlessly, the conductive plastic block electrically contacts with the grounding contacts to electrically connect the grounding contacts together. Therefore, the seamless state prevents any loose from the conductive plastic block and the insulative one, which could make the terminal base to be steadier.

17 Claims, 9 Drawing Sheets



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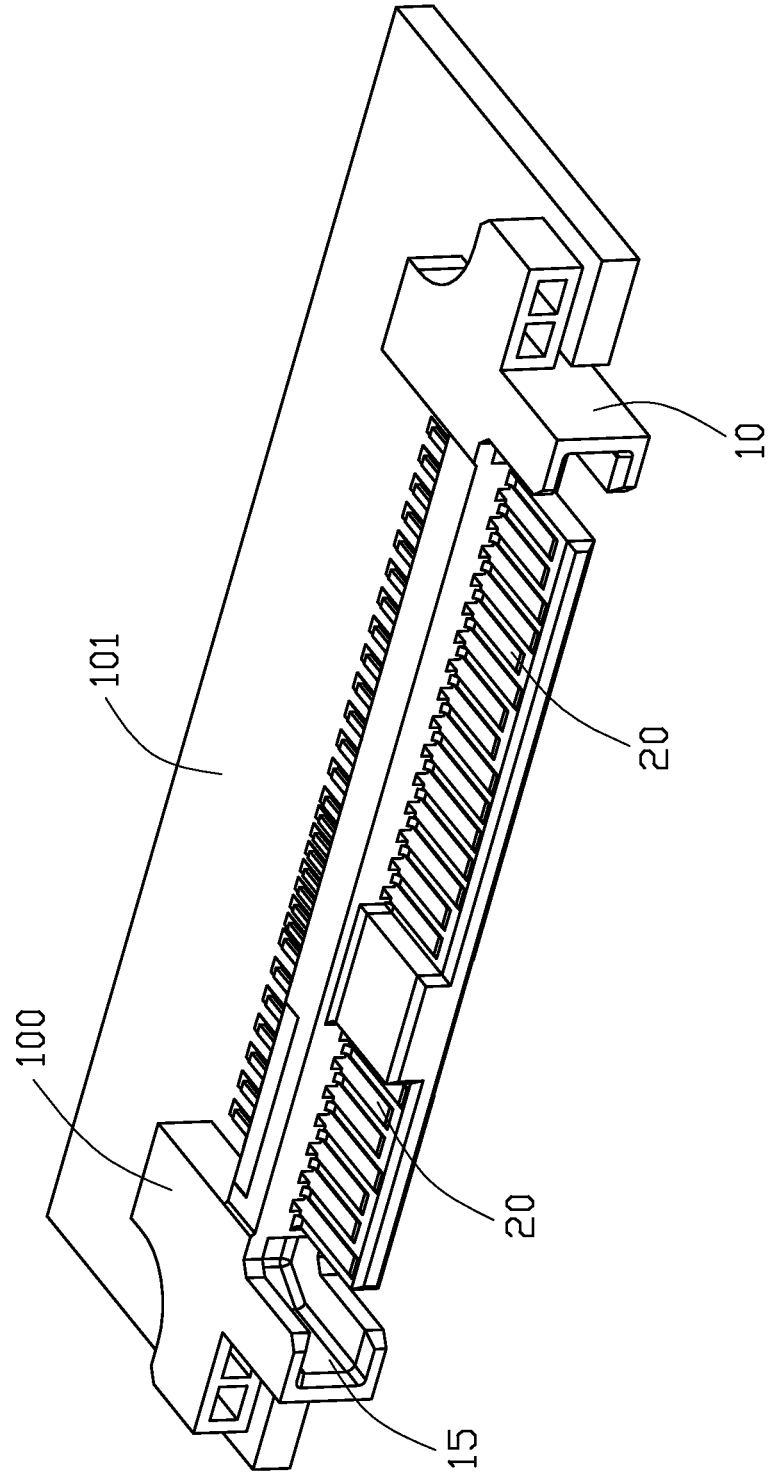

FIG. 1

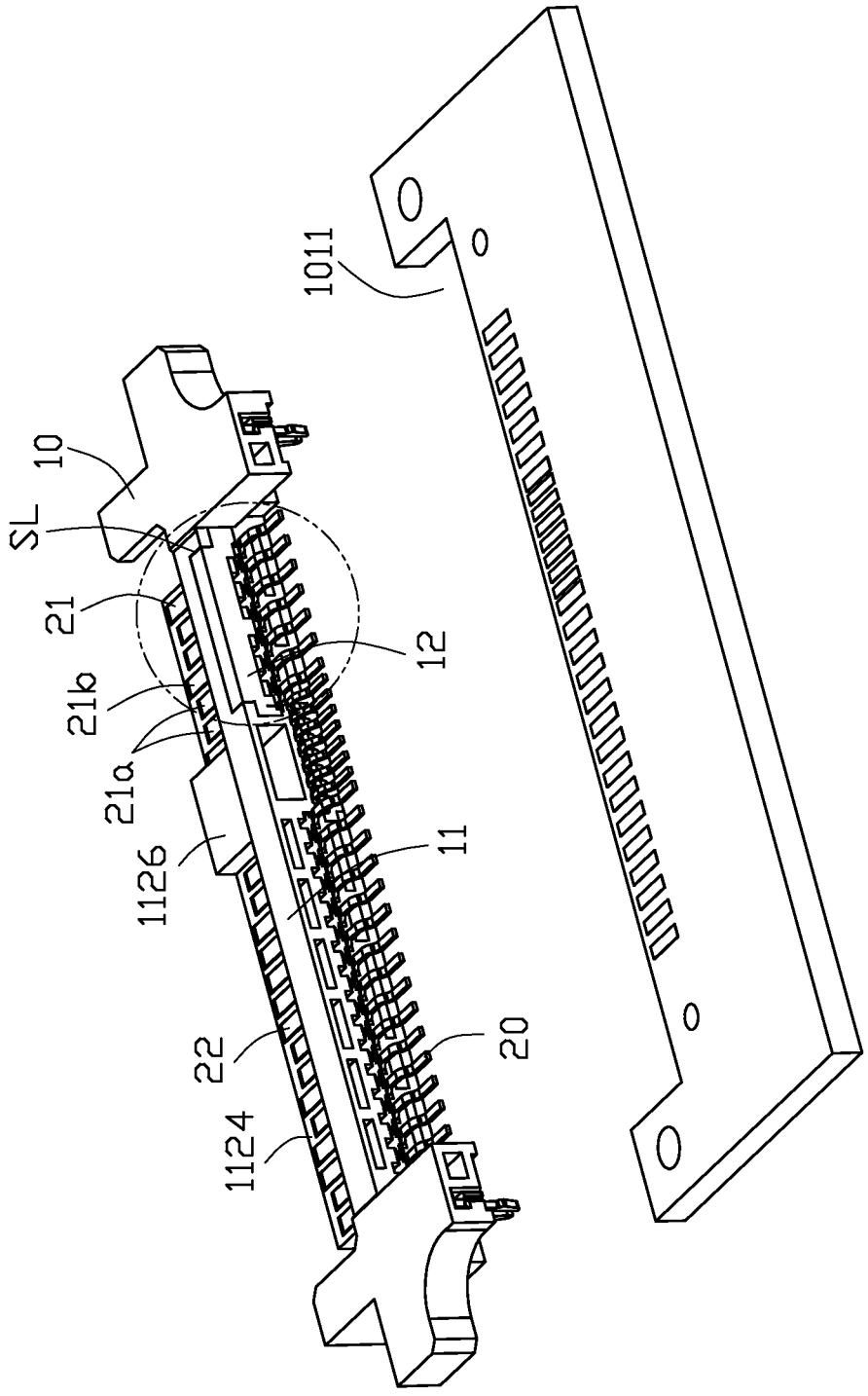

FIG. 2

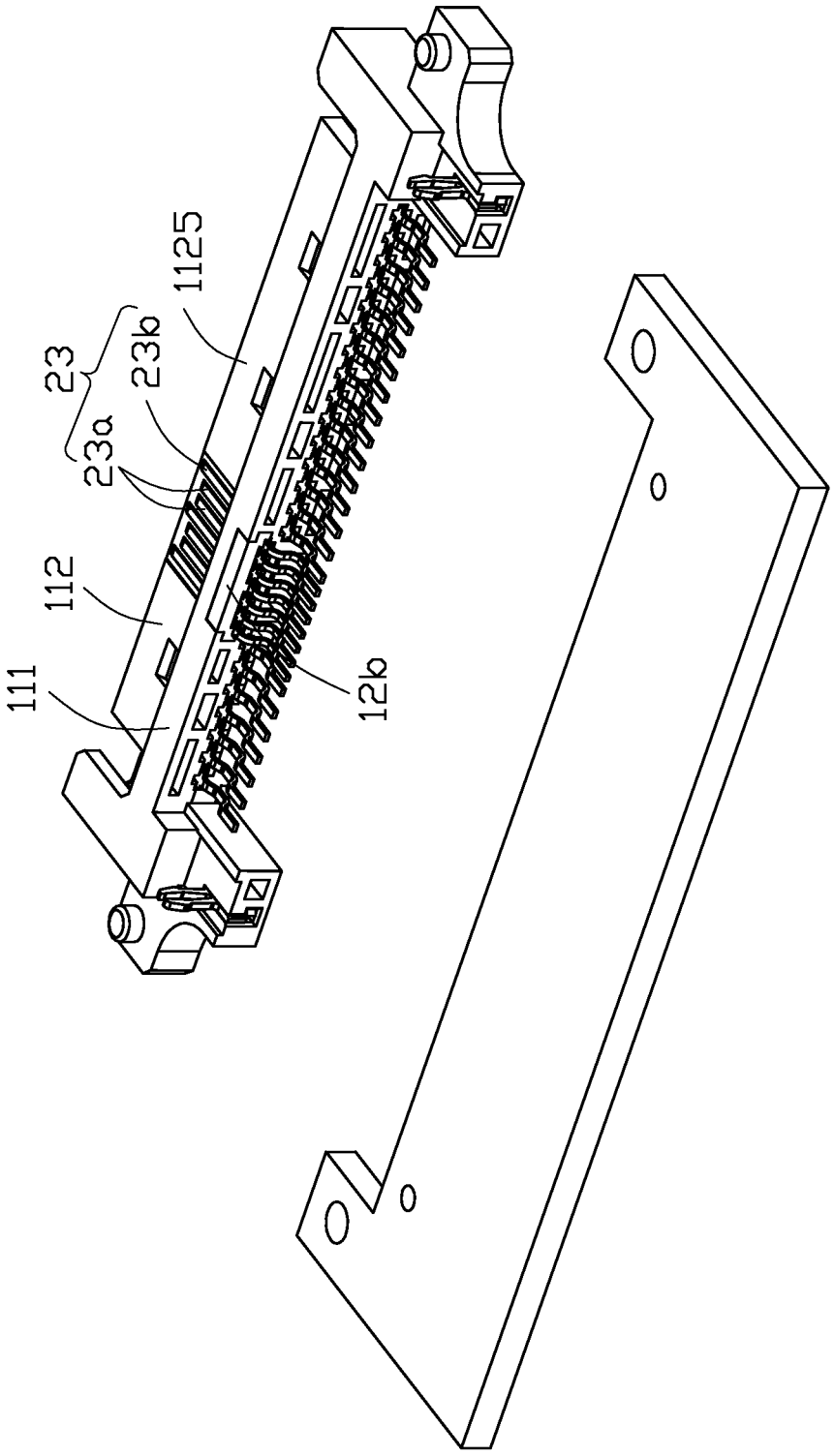

FIG. 3

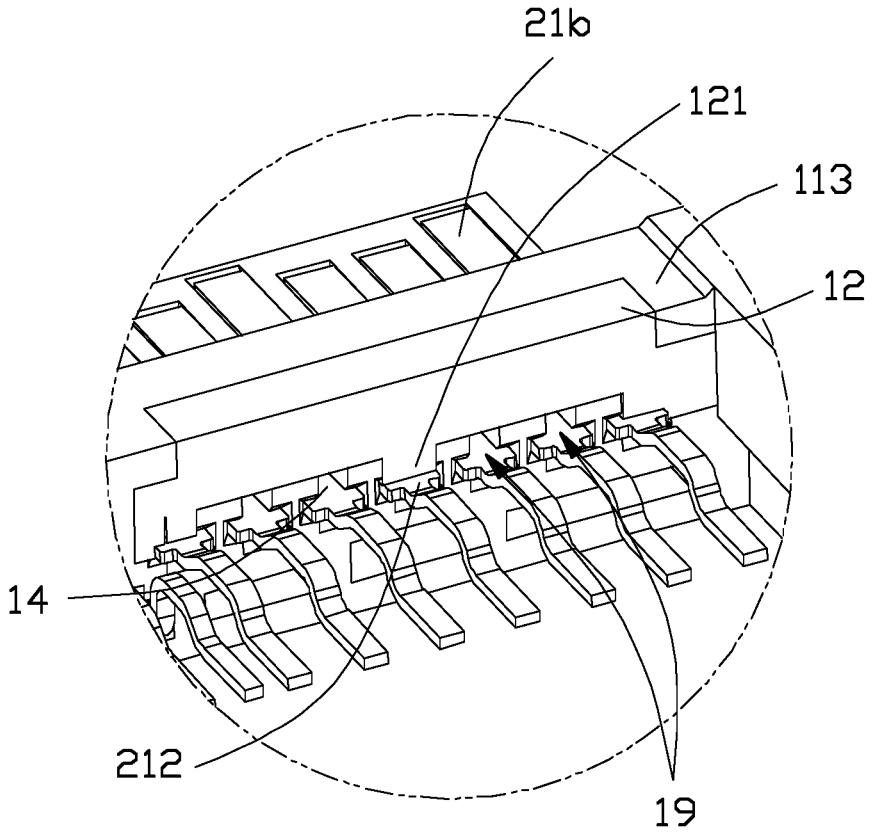

FIG. 4

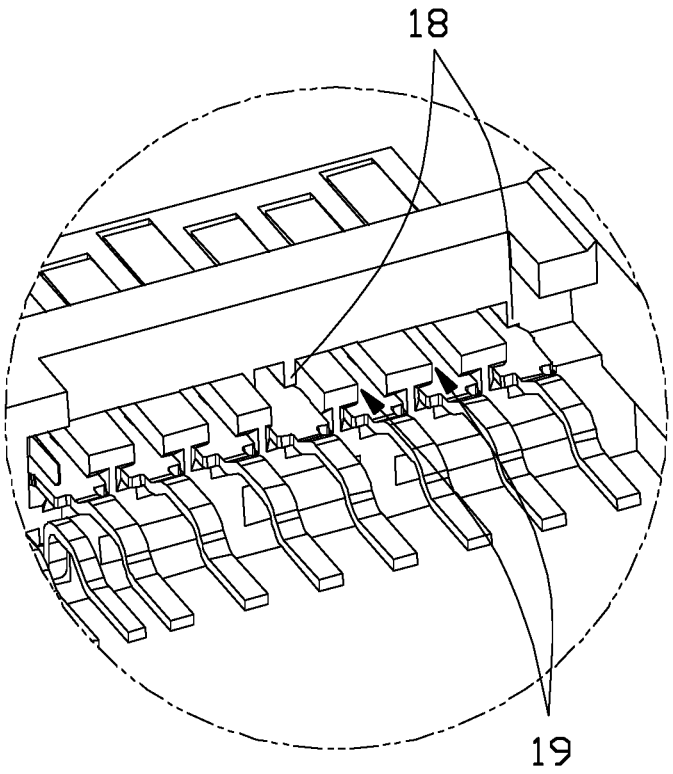

FIG. 4(A)

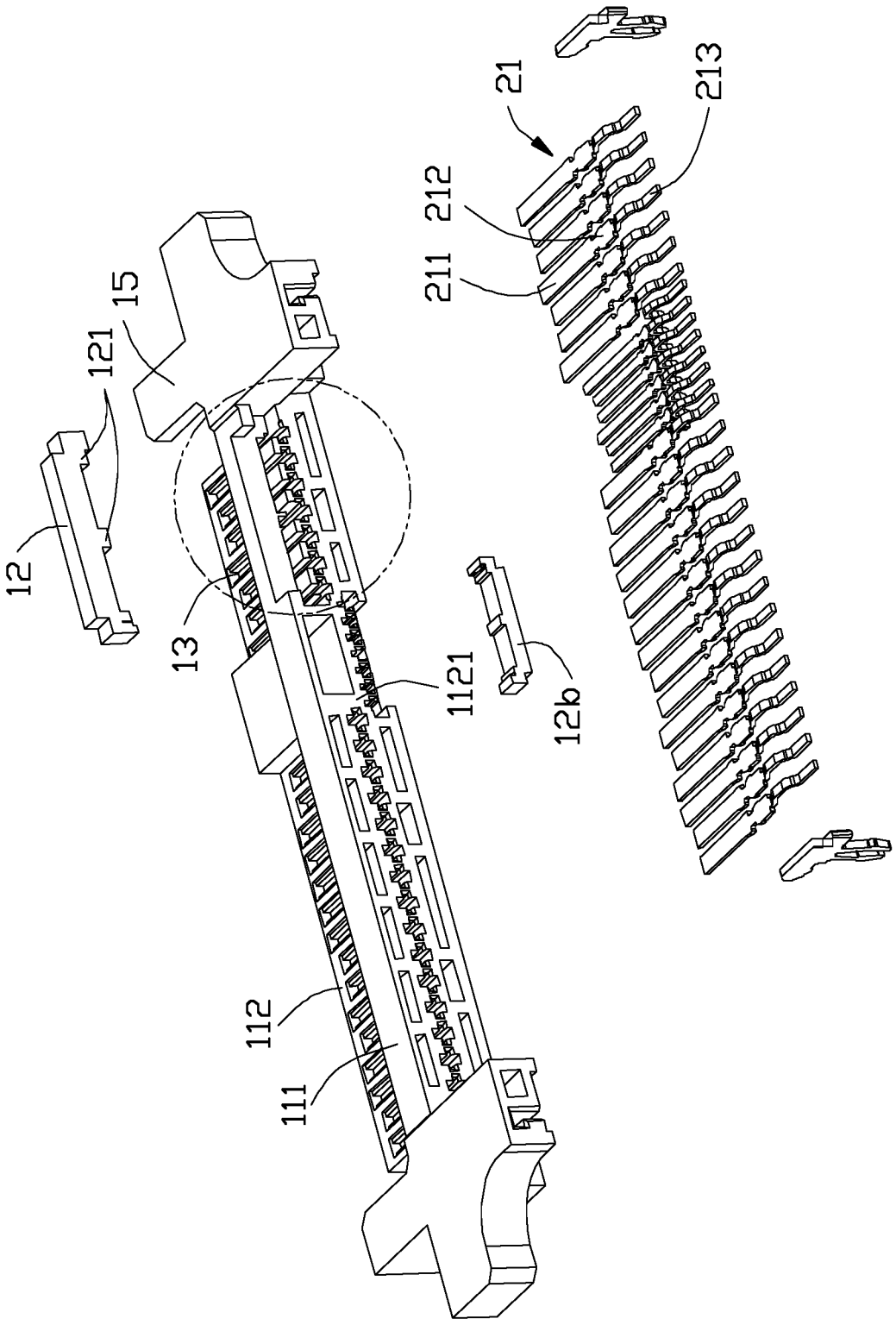

FIG. 5

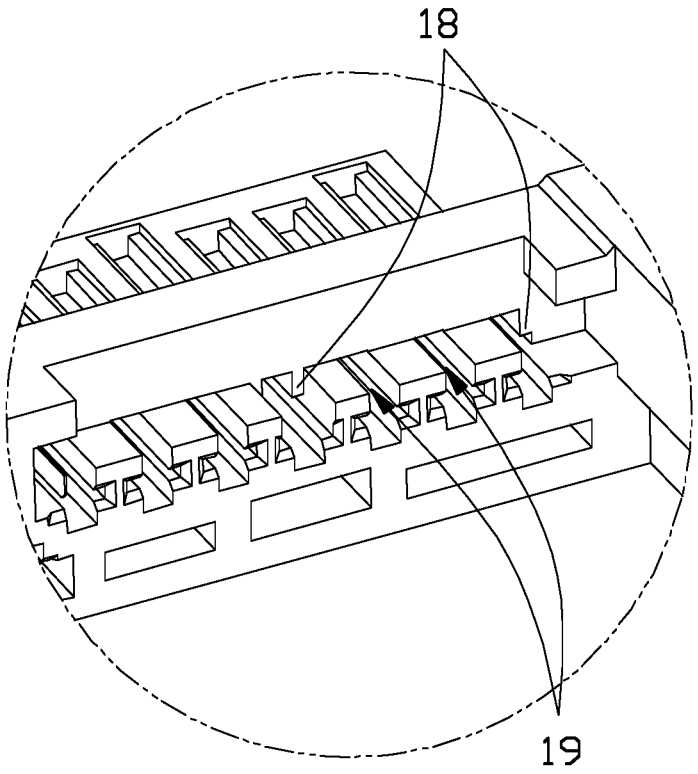

FIG. 5(A)

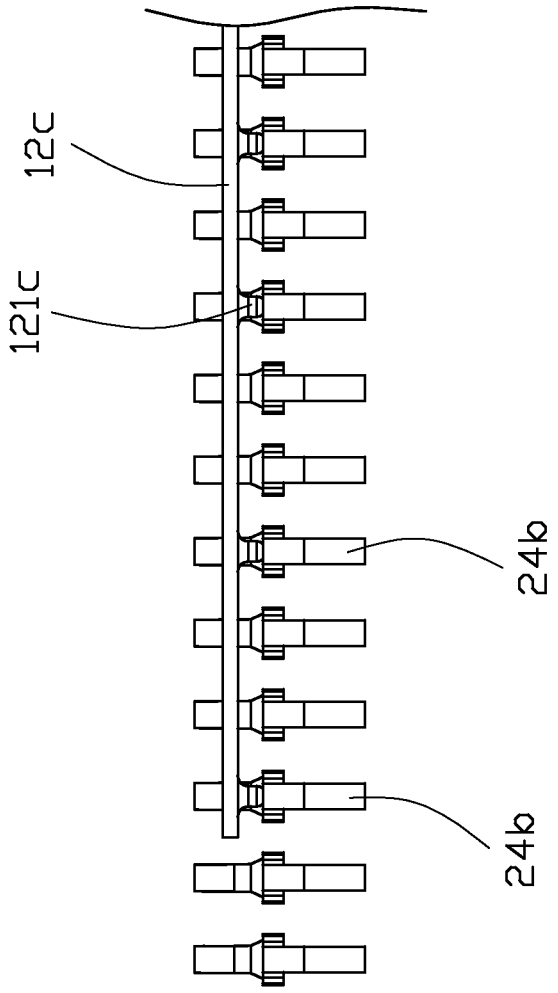

FIG. 6

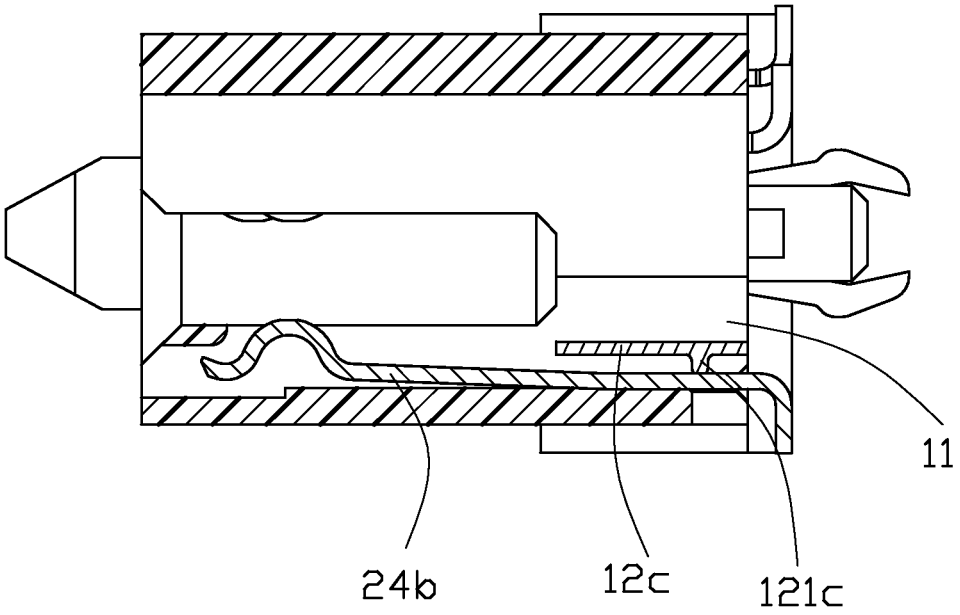

FIG. 7

ELECTRICAL CONNECTOR WITH AN IMPROVED TERMINAL BASE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an electrical connector, more particularly to an electrical connector with an improved terminal base.

2. Description of Related Art

China Patent application No. 201120575876.0, published on Dec. 5, 2012, discloses a high transmission rate electrical connector, and the electrical connector has an insulative housing, a plurality of contacts and at least two conductive plastic blocks. The insulative housing defines at least a groove in it's tongue plate, and the contacts defines a first group of signal contacts, a second group of signal contacts and a third group of power contacts. Every group of contacts includes positive contacts and negative contacts, and every contact has a contact portion. The contact portions of the first group of signal contacts are retained above the groove, and a space is formed from the insulative housing and the contact portions. The conductive plastic blocks connect with the negative contacts of the first and the second group of signal contacts respectively. Therefore, the first group of signal contacts could improve the electrical properties by a better contact between the contact portion and the air, which could improve the transmission rate of the first group of signal contacts. And meanwhile the conductive plastic block shields the signal contacts which could reduce the interference between adjacent signal contacts, and it could improve the transmission rate of the first group of signal contacts higher. However it may be loosened when the conductive plastic blocks are assembled in the insulative housing.

BRIEF SUMMARY OF THE INVENTION

An object of the present invention is to provide an electrical connector which could keep the terminal base steady.

In order to achieve the above-mentioned object, an electrical connector includes terminal base and a plurality of conductive contacts. The conductive contacts define a first group of contacts, and the first group of contacts includes several signal contacts and several grounding contacts. The terminal base includes an insulative housing and a conductive plastic block integrally molded with the insulative housing and combining with the insulative housing seamlessly, and the conductive plastic block electrically contacts with the grounding contacts to electrically connect the grounding contacts together.

Therefore, it can prevent any loose from the conductive plastic block and the insulative housing, which could make the terminal base to be steadier.

The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter which form the subject of the claims of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a perspective view of an electrical connector mounting in an electrical card according to an aspect of the present invention;

FIG. **2** is an exploded view of the electrical connector shown in FIG. **1**;

FIG. **3** is a perspective view in another direction of the electrical connector shown in FIG. **2**;

FIG. **4** is an enlarged view of the circle shown in FIG. **2**;

FIG. **4**(A) is the enlarged portion as shown in FIG. **4** without the corresponding conductive plastic block thereof;

FIG. **5** is an exploded view of the electrical connector shown in FIG. **4**;

FIG. **5**(A) is a partial enlarged view of the circled portion of the electrical connector shown in FIG. **5**;

FIG. **6** is a partly view of a group of contacts according to another aspect of the present invention;

FIG. **7** is a section view of the contacts shown in FIG. **6** assembled in an insulative housing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will be made to the drawing figures to describe the present invention in detail, wherein depicted elements are not necessarily shown to scale and wherein like or similar elements are designated by same or similar reference numeral through the several views and same or similar terminology.

According to the present invention, an electrical connector is provided to be used in a high-frequency signal transmission, and the electrical connector could be a board connector or a cable connector. Referring to FIGS. **1-3**, the present aspect of the invention shows an electrical connector **100** retains in a notch **1011** of a mating electrical card **101**, that is, the electrical connector and the mating electrical card form a sinking type structure. The electrical connector **100** includes terminal base **10** and a plurality of conductive contacts **20**. The conductive contacts **20** define a first group of contacts **21**, and the first group of contacts includes a set of signal contacts **21***a* and a set of grounding contacts **21***b* arranged with the signal contacts at intervals. The terminal base **10** includes an insulative housing **11** and a conductive plastic block **12** integrally molded with the insulative housing **11** and combine with the insulative housing **11** seamlessly, the conductive plastic block **12** electrically contacts with the grounding contacts **21***b* to electrically connect the grounding contacts **21***b* together. The insulative housing **11** and the conductive plastic block **12** is made by twice-step injection molding, and the line SL shown in FIG. **2** between the insulative housing **11** and the conductive plastic block **12** is for distinguishing the positional relationship thereof. However the electrical connector **100** does not have the line SL only if the conductive plastic block **12** and the insulative housing **11** made in different colors, and the line SL is defined as a dividing line. Due to different materials, the insulative housing **11** and the conductive plastic block **12** have different endurance, and when it applies a large force between the two parts by a tool, the two parts could separate from each other along the line SL. The seamless state between the insulative housing **11** and the conductive plastic block **12** could avoid any loose therebetween, that could make the terminal base **10** to be steadier.

Referring to FIG. **5** (the explode view of the electrical connector shows every parts separately for a clear understanding about the electrical connector, but the conductive plastic block **12** and the main portion **111** is inseparable actually), and in the present aspect of the invention, the insulative housing **11** includes a main portion **111** and a tongue plate **112** extending forwardly from the main portion **111** and

a pair of guide arms **15** on both sides of the tongue plate **112** and extending forwardly from the main portion **111**. The guide arms **15** are spaced from the tongue plate **112**. The tongue plate **112** defines a plurality of slots **13** for receiving the conductive contacts **20**, and the slots **13** pass backwards through the rear surface of the main portion **111**. The said slots **13** are formed after the insulative housing **11** and the conductive plastic block **12** are molded, and then the first group of contacts **21** is inserted from rear surface into the slots **13**. Each of the first group of contacts **21** include a contact portion **211** located in the tongue plate **112**, a retaining portion **212** retained in the main portion **111** and a soldering tail **213** extending through the rear surface **1121** of the main portion **111**. The contact portion **211** and the retaining portion **212** are planar-shaped. Referring to FIG. **4**, the main portion **111** defines a groove **14** communicating with the slots and corresponding to the retaining portions **212** of the signal contacts **21***a*. And corresponding to the retaining portions **212** of the grounding contacts **21***b*, the conductive plastic block defines several protruding portions **121** protruding into the groove **14** and electrically resisting the retaining portions **212** of the grounding contacts **21***b*. In the present aspect of the invention, the conductive plastic block **12** is set in the main portion **111** and resists the retaining portions **212** of the all grounding contacts **21***b*. The slots **13** present as a ladder-shape, one surface of the conductive plastic block **12** is flush with the tongue plate **112**, and the other surface of the conductive plastic block forms a space from the insulative housing. In other aspects of the invention, the conductive plastic block could be set in a different area of the insulative housing, such as set in the tongue plate **112**.

Referring to FIG. **4**, the main portion **111** of the insulative housing **11** defines a side surface **113** parallel with the tongue plate **112**. The conductive plastic block **12** is flush with the side surface **113** of the main portion **111**, and the conductive plastic block **12** is also flush with the back surface **1121** of the main portion **111**. In the process of forming the terminal base **10**, the conductive plastic block **12** and the insulative housing **11** are integrated-molded. And the side surface **113** or the back surface **1121** of the conductive plastic block **12** forms at least an injection port (not shown in the figure) for molding, and the injection port is formed by an injection device after injection. Finally, when the terminal base is formed and the molds are removed, the conductive plastic block **12** and the insulative housing **11** are integrated.

Referring to FIGS. **2-3**, the tongue plate **112** defines a first surface **1124** and a relative second surface **1125**. The first surface **1124** has a convex rib **1126** separating the first surface into two parts, and the first group of contacts **21** is arranged in one part of the first surface. The conductive contacts **20** above mentioned define a second group of contacts **22** arranged in another part of the first surface and a third group of contacts **23** arranged in the second surface. The third group of contacts **23** includes a set of signal contacts **23***a* and a set of grounding contacts **23***b* arranged with the signal contacts **23***a* at intervals. The terminal base **10** comprises another conductive plastic block **12***b* integrally molded with the insulative housing and combining with the insulative housing seamlessly, the another conductive plastic block electrically contacts with the grounding contacts **23***b* of the third group of contacts to electrically connect them together. The conductive plastic block **12***b* is formed as the conductive plastic block **12**, and the conductive plastic block **12***b* is flush with the side surface and the back surface of the main portion **111**. As the foregoing description, the detail and the processing of another conductive plastic block **12***b* is similar as that of the conductive plastic block **12** mentioned above, so that there is no longer a detail description hereafter. Referring to FIGS. **4**, **4**(A), **5** and **5**(A), it is further noted that in the terminal base **10**, the insulative housing **11** and the conductive plastic block **12** commonly form a plurality of channels **19** located above and aligned with retaining portions **212** of the corresponding conductive contacts **20**, respectively, in a vertical direction perpendicular to both the lengthwise direction and the front-to-back direction, the conductive plastic block **12** directly faces the channels in the vertical direction, and the channels extend rearwardly through a rear said of the terminal base in the front-to-back direction. Moreover, the housing **11** forms a plurality of protrusions **18** located intimately in front of the conductive plastic block **12** to cooperate with the conductive plastic block **12** to commonly downwardly abut against the corresponding same grounding contacts **21***b*, respectively.

Referring to FIGS. **6-7**, as another aspect of the present invention, the conductive plastic block could be replaced as a metal part **12***c*. The metal part **12***c* is retained in the insulative housing **11** and the metal part **12***c* defines a set of protruding portion **121***c* protruding forwards the grounding contacts **24***b* and resisting the grounding contacts **24***b* to electrically connect them together.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the board general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. An electrical connector comprising:

a terminal base;

a plurality of conductive contacts retained in the terminal base, the conductive contacts including a first group of contacts, and the first group of contacts including a set of signal contacts and a set of grounding contacts arranged with the signal contacts at intervals;

wherein the terminal base includes an insulative housing, and a conductive plastic block integrally molded with the insulative housing and combining with the insulative housing seamlessly, the conductive plastic block electrically contacts with the grounding contacts to electrically connect the grounding contacts together; wherein

the insulative housing includes a main portion and a tongue plate extending forwardly from the main portion, and each of the first group of contacts include a contact portion located in the tongue plate, a retaining portion retained in the main portion and a soldering tail extending through a rear surface of the main portion, wherein the conductive plastic block is set in the main portion and abuts against the retaining portions of the all grounding contacts; wherein

the tongue plate defines a plurality of slots, and the slots pass backwards through the rear surface of the main portion, wherein the main portion defines a groove communicating with the slots and corresponding to the retaining portions of the signal contacts, and the conductive plastic block defines several protruding portions protruding into the groove and electrically and mechanically abutting against the retaining portions of the grounding contacts.

2. The electrical connector as described in claim **1**, wherein the insulative housing and the conductive plastic block is made by twice-step injection molding.

3. The electrical connector as described in claim 1, wherein the main portion of the insulative housing defines a side surface parallel with the tongue plate, wherein the conductive plastic block is flush with the side surface of the main portion, and the conductive plastic block is flush with the back surface of the main portion.

4. The electrical connector as described in claim 1, wherein the side surface or the back surface of the conductive plastic block forms at least an injection port for molding.

5. The electrical connector as described in claim 1, wherein the tongue plate defines a first surface and a relative second surface, and the first surface has a convex rib separating the first surface into two parts, wherein the first group of contacts is arranged in one of the two parts of the first surface, and the conductive contacts define a second group of contacts arranged in another part of the first surface and a third group of contacts arranged in the second surface, wherein the third group of contacts includes several signal contacts and several grounding contacts arrange with the signal contacts at intervals, and the terminal base comprises another conductive plastic block integrally molded with the insulative housing and combine with the insulative housing seamlessly, the another conductive plastic block electrically contacts with the grounding contacts of the third group of contacts to electrically connect them together.

6. The electrical connector as described in claim 5, wherein another conductive plastic block is flush with the side surface and the back surface of the main portion.

7. The electrical connector as described in claim 1, wherein the insulative housing defines a pair of guide arms on both sides of the tongue plate and extending forwardly from the main portion, and the guide arms are spaced from the tongue plate.

8. The electrical connector as described in claim 1, wherein the slots present as a ladder-shape, one surface of the conductive plastic block is flush with the tongue plate and the other surface of the conductive plastic block forms a space from the insulative housing.

9. An electrical connector comprising:

a terminal base including an insulative housing and a conductive plastic block, said insulative housing extending along a lengthwise direction;

a plurality of conductive contacts retained in the housing in one row along said lengthwise direction, each of said contacts extending along a front-to-back direction perpendicular to said lengthwise direction, said contact being categorized with signal contacts and grounding contacts; and

said conductive plastic block integrally molded with the insulative housing after the insulative housing is formed, and extending along said lengthwise direction to selectively mechanically and electrically connect to the corresponding grounding contacts; wherein

in the terminal base, the insulative housing and the conductive plastic block commonly form a plurality of channels located above and aligned with retaining portions of the corresponding conductive contacts, respectively, in a vertical direction perpendicular to both said lengthwise direction and said front-to-back direction, said conductive plastic block directly faces said channels in said vertical direction, and said channels extend rearwardly through a rear surface of the terminal base in said front-to-back direction.

10. The electrical connector as claimed in claim 9, wherein said housing is made via a first injection molding and said conductive plastic block is made a second injection molding applied upon the formed housing.

11. The electrical connector as claimed in claim 10, wherein all the contacts are retained by the housing via an insert molding process during the first injection molding, and the selected grounding contacts are retained by the conductive plastic block via another insert molding process during the second injection molding.

12. The electrical connector as claimed in claim 9, wherein said conductive plastic block respectively contacts the corresponding grounding contacts in said vertical direction.

13. The electrical connector as claimed in claim 9, wherein said conductive plastic block is located around a rear side of the housing and exposed rearwardly and upwardly to an exterior in both the front-to-back direction and a vertical direction perpendicular to both said lengthwise direction and said front-to-back direction.

14. The electrical connector as claimed in claim 9, wherein said insulative housing forms protrusions intimately located in front of the conductive plastic block in said front-to-back direction, and cooperating with said conductive plastic block to commonly downwardly press the same grounding contacts in said vertical direction, respectively.

15. A method of making an electrical connector, comprising steps of:

injection molding an insulative housing;

retaining a plurality of conductive contacts to the housing wherein said contacts are categorized with signal contacts and grounding contacts, each of said contacts extending along a front-to-back direction;

injection molding a conductive plastic block upon the insulative housing so as to form a complete terminal base; wherein

said conductive plastic block mechanically and electrically connect to the selected grounding contacts, respectively; wherein

all the conductive contacts is retained to the insulative housing via an insert-molding process during injecting molding the insulative housing, and said selected grounding contacts are further retained to the conductive plastic block via another insert-molding process during injection molding the conductive plastic block; wherein

the housing and the conductive plastic block commonly form a plurality of channels respectively facing the corresponding contacts in a vertical direction perpendicular to said front-to-back direction, and said channels are rearwardly exposed to an exterior in a rear surface of the terminal base and occupied by a corresponding mold during injection molding the conductive plastic block.

16. The method as claimed in claim 15, wherein said conductive block forms a top portion and a rear portion of a contour of said terminal base.

17. The method as claimed in claim 15, wherein said insulative housing forms protrusions intimately located in front of the conductive plastic block in said front-to-back direction, and cooperating with said conductive plastic block to commonly downwardly press the same grounding contacts in said vertical direction, respectively.

* * * * *